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GOLMO AREA

I. Terrain and Vegetation

The important communications center of Golmo (Ka-erh-mu) is located at the southern edge of the Tsaidam Basin at the juncture of the important north-south route to Tibet via Tun-huang and the east-west Tsinghai-Sinkiang road. A few miles south of Golmo, the Kailu mountains rise sharply over which high passes lead onto the Tsinghai-Tibet plateau that extends for several hundred miles to the south. A 50-mile radius circle centered at Golmo thus includes within it three distinct types of terrain: 1) the sand and gravel plains, swamps, and salt lakes of the Tsaidam Basin; 2) the steep, broken northern face of the Kailu and its outliers; and 3) the northern Tsinghai plateau drained by the northernmost tributaries of the Yangtze.

Tsaidam. In the vicinity of Golmo, the terrain of the Tsaidam consists of three belts or zones that extend north from the mountains to the basin's center. At the south is a strip of barren gravel plain which averages about 10 miles in width and which extends outward (to the north) from the mountains. The plain is level, sloping gently from elevations of about 10,000 feet to roughly 9,000 feet. Occasional sand dune areas occur and some of the larger streams that flow from the mountains to the basin have cut ravines into the plains. The plains merge into a second belt of a few miles across in which

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that consists of a combination of dunes, gravel ridges, and mounds. In turn, the mounds and dunes give way to a flat plain consisting of swampy terrain through which wind sluggish streams that eventually empty into terminal brackish lakes, often surrounded by sterile salt flats. There are a number of additional lakes and swampy areas north of Golmo not shown on the best available map of the area, sheet NG-46, of the 1:1,000,000 series.

The ease of foot travel in this area varies with the local terrain conditions and seasonally. In general, conditions for movement decrease from south to north with the poorest conditions existing in the swampy bogs and depressions associated with the terminal lakes in which the north-flowing streams empty. The gravel plains adjacent to the mountains present no problems with the exception of the few places where major streams have cut ravines into the surface. Travel is more difficult to the north in areas of mounds and sand dunes, although these areas usually are not too extensive or are broken sufficiently by terrain more suitable for travel. The 20 to 40 miles wide belt of flat, swampy land that marks the central portion of the Tsaidam basin, however, presents great difficulty to travel during much of the year. During the warmer months, the streams are full and many depressions are filled with water. Although the ground apparently dries after October, the presence of subsurface water so near the surface results in many boggy areas that are treacherous to cross. In places, salt crusts that appear solid mask bogs underneath.

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Kunlun Mountains: The Kunluns extend for roughly 50 miles from the southern edge of the Tsaidam basin to the passes that lead onto the high Tsinghai plateau. Elevations increase from about 10,000 feet in the north to 15,000 to 16,000 foot passes to the south; a few peaks reach 19,000 to 20,000 foot heights. The steep northern face of the Kunluns is cut and broken by numerous north-flowing streams that flow into the Tsaidam. Before the high plateau lands are reached, however, a few streams including the headwaters of the Ha-chi river that flows by Golmo have east-west aligned valleys within this zone of mountains. Although movement is handicapped by the steep slopes and generally channelized by the stream valleys, some of the east-west aligned valleys mentioned above extend for some distance

and open sufficiently to provide relative easy travel. The Tsinghai-Tibet road, for example, utilizes the western headwater valley of the Ma-chi. Otherwise, most of the stream valleys in the Kunluns flow in part through narrow valleys or gorges in which travel is difficult and arduous.

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Tsinghai Plateau: The elevation of Tsinghai Plateau ranges from 14,000 to 15,000 feet with heights decreasing from west to east. The area is drained by the northernmost tributaries of the Yangtze River. The terrain generally is undulating with numerous plains and broad valleys; locally, there are rocky ridges and outcrops and some streams flow for short distances through narrow gullies. The larger streams often have numerous channels, and the terraces bordering them frequently are marshy. A few small lakes and fairly numerous semipermanent pools of water dot the plains during summer. Most of the valleys and plains are covered with grass; in a few places, sand dunes are found. Aside from grass and alpine grasses, no other type of vegetation occurs.

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II. Climate

The northern Tsinghai plateau has a climate probably quite similar to that of the Nagchhu Dzong area, with very cold temperatures during winter and frost and snow possible even during summer. The Lunlun and other mountains, however, are a minor climatic divide, and somewhat warmer temperatures and considerably less yearly precipitation are characteristics of the climate in the Tsaidam Basin. Climatic data for a short period of time are available for Golmo and two other stations to the east near Loko Mar. The latter figures are indicative of the climate of that area and are suggestive of probable climatic conditions in the northern Tsinghai plateau.

Tsaidam: The climate of the Tsaidam Basin is characterized by scant precipitation, wide variations in temperatures, and strong westerly winds that prevail throughout the year. Temperatures show great variations during the seasons, with cold winters and relatively low summer temperatures. Minimum temperatures during winter average a few degrees below zero and readings to -20°F have been recorded. Although the brief period of record shows an average summer maximum of slightly under 80°F , it is probable that somewhat higher temperatures are recorded. At Golmo, some 70 days annually are recorded with wind mixed with driving sand. Even during summer, temperatures near freezing may occur as witnessed by a low of 35°F in July of 1956 and a low of 33°F in August of the same year.

Although low precipitation is characteristic of the Tsaidam, the three year average of only one inch at Golmo is undoubtedly on the low side. A

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longer period of record probably will give an average of closer to 4 to 5 inches. In arid, desert climates, such as the Tsaidam possesses, yearly variations in precipitation commonly are great.

The strong, dry westerly winds are one of the hazards of the area; attempts by the Chinese to cultivate crops near Golmo have been made difficult by the searing wind and drifting sand. Spring and summer are the peak periods of the year for wind. When strong, westerly winds passes over tall sand mounds, the burning effect of the wind as it passes along the lee slope is often sufficient to kill plants. Under these conditions, temperature readings on the surface of the sand have reached 160°-177°F.

Tsinghai Plateau: Records for two stations near Koko Nor are included, with those for Ch'ia-pu-ch'ia more likely akin to the conditions farther west. Winter temperatures undoubtedly are lower, and the accounts of explorers suggest that readings of -20°F are common during the heart of winter. Summer readings probably are similar to those at Ch'ia-pu-ch'ia.

Precipitation amounts are unknown but an average probably would be at least 10 inches. An expedition across the northern Tsinghai plateau recorded precipitation from June through September on slightly more than half of the days. Thunderstorms were frequent during July through September, often accompanied by hail. An inch or more snow was recorded by the expedition during July, at an elevation of about 15,000 feet. Temperatures during summer may drop to the mid-20's. Winter snowfall is believed light and with little accumulation; as is the case in the Nagchhu area, exceptional winters with heavier snows probably are experienced.

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SELECTED TEMPERATURE AND RAINFALL STATISTICSFOR KA-ERH-MU*Monthly Average Temperature (°F.)

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
10	13	32	42	52	57	63	57	50	32	22	13

Monthly Maximum Temperature (°F.)

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
23	35	49	55	62	72	78	73	67	53	41	30

Monthly Minimum Temperature (°F.)

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
-5	0	14	27	29	44	52	46	32	20	5	-2

Monthly Absolute Maximum Temperature (°F.)

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
48	55	68	73	77	85	91	86	77	73	59	44

Monthly Absolute Minimum Temperature (°F.)

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
-23	-16	-6	5	18	30	35	31	23	7	19	-16

Average Monthly Rainfall (Inches)

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Total</u>
.05	.02	.06	.08	.12	.10	.12	.18	.18	.02	.02	.04	1 in.

* Ka-erh-mu 36°25'N., 94°54'E. Elevation approx. 9,035.6 ft. Based on statistics of Ka-erh-mu Weather Station. Length of record -- 3 yrs.

SELECTED CLIMATIC STATISTICS FOR
TU-LAN-SZU AND CH'IA-PU CH'IA (KUNG-HO)*

Jan

Mean Monthly Temperatures (°F.)

	<u>Jan</u>	<u>Apr</u>	<u>Jul</u>	<u>Oct</u>
Tu-lan-szu	16	42	62	41
Ch'ia-pu-ch'ia	12	41	59	39

Mean Maximum Temperatures (°F.)

	<u>Jan</u>	<u>Apr</u>	<u>Jul</u>	<u>Oct</u>
Tu-lan-szu	35	56	76	58
Ch'ia-pu-ch'ia	29	56	71	53

Mean Minimum Temperatures (°F.)

	<u>Jan</u>	<u>Apr</u>	<u>Jul</u>	<u>Oct</u>
Tu-lan-szu	2	29	49	27
Ch'ia-pu-ch'ia	-3	27	48	28

Absolute Minimum Temperatures (°F.)

	<u>Jan</u>	<u>Apr</u>	<u>Jul</u>	<u>Oct</u>
Tu-lan-szu	-11	5	35	8
Ch'ia-pu-ch'ia	-15	11	27	9

Number of Days Temperature Below Freezing

	<u>Jan</u>	<u>Apr</u>	<u>Jul</u>	<u>Oct</u>
Tu-lan-szu	31	1	0	1
Ch'ia-pu-ch'ia	31	0	0	4

* Tu-lan-szu 37°01'N, 98°46'E. Elevation 9,790.8 feet. Ch'ia-pu-ch'ia (Kung-ho) 36°04'N, 100°54'E. Elevation approximately 11,480 feet.

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Amount of Precipitation (Inches)

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Total</u>
Tu-lan-szu	.03	.09	.18	.38	.75	1.1	1.22	1.09	.57	.04	.06	.05	5.40
Ch'ia-pu-ch'ia	.04	.02	.15	.12	.03	1.25	3.46	3.94	1.62	.74	.07	.05	12.31

Average Number of Days With
Over 0.1 Millimeter of Precipitation

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Tu-lan-szu	1	1	2	2	5	6	5	6	4	1	1	1
Ch'ia-pu-ch'ia	2	1	2	2	8	12	15	17	11	6	2	3

Maximum Snow Accumulation (Inches)

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Ch'ia-pu-ch'ia	.39	1.57	3.14	1.18	0	0		0	0	.39	.78	1.96

(Length of record -- 2 years. No record for Tu-lan-szu.)

Average Number of Days of
Snow Accumulation

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Total</u>
Ch'ia-pu-ch'ia	6	4	2	1	0	0	0	0	0	1	2	11	24.5

(Length of record -- 2 years. No record for Tu-lan-szu.)

Average Number of Clear Days

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Tu-lan-szu	9	6	5	4	3	3	3	3	5	11	8	9
Ch'ia-pu-ch'ia	11	5	4	2	1	1	2	5	5	4	12	10

(Length of record -- Tu-lan-szu, 5 years; Ch'ia-pu-ch'ia, 2 years.)

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Average Number of Cloudy Days

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Tu-lan-szu	10	10	14	16	16	18	15	13	10	8	9	11
Ch'ia-pu-ch'ia	4	6	9	9	12	12	14	10	11	8	3	5

(Length of record -- Tu-lan-szu, 5 years; Ch'ia-pu-ch'ia, 2 years.)